

REMARKS

By this amendment, claims 1, 11, 24-25, 33, and 36 have been amended. Claims 1-45 are pending in the application. Applicant reserves the right to pursue the original claims and other claims in this and other applications. The specification has been amended in minor fashion and no new matter has been added.

Claims 1-2, 4, 6, 9-12, 14, 16, 19-20, 25, and 27-34 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Booth (US 6,078,037). This rejection is respectfully traversed.

The claimed invention is directed toward collecting charge in a photodiode during a single integration period and transferring it to a first storage node, and storing excess charge on at least one additional storage node. Paragraph [0027]. On the other hand, Booth is related to reducing noise in moving images by capturing “multiple frames in rapid succession” and averaging the multiple exposures. Col. 3, ln. 12-14 and 38-39.

As such, claim 1 recites a pixel cell comprising, *inter alia*, “a first storage node for storing charge generated at a photosensitive element during an integration period prior to storing said charge at a floating diffusion region of said pixel cell; and a second storage node for storing a portion of said charge generated ... during the integration period that is not stored by said first storage node and prior to storing said portion of said charge at said floating diffusion region” (emphasis added). Claims 11 and 33 recite similar limitations.

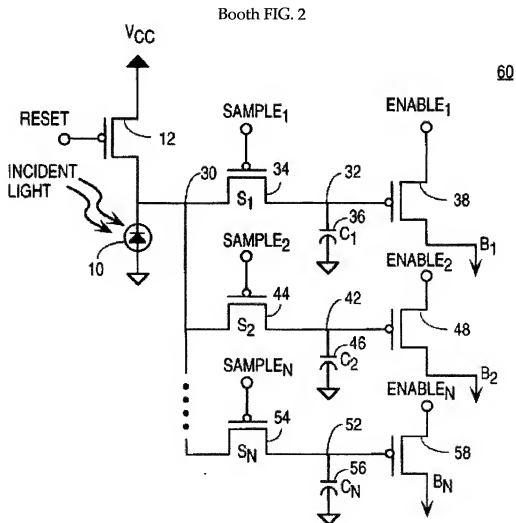
Claim 25 recites a method for operating an image sensor comprising, *inter alia*, “receiving, at a first storage node of a pixel cell, charge generated by a photosensitive element of said pixel cell during an integration period; receiving, at a second storage node

of said pixel cell, a portion of said charge generated ... during the integration period not stored at said first storage node; and transferring said charge from at least one of said first and second storage nodes to a floating diffusion region of said pixel cell.” (emphasis added). Applicant respectfully submits that Booth does not disclose these limitations.

To the contrary, Booth discloses that “At functional block 114, SAMPLE₁ is asserted causing the capture of the voltage from the light sensitive element. At functional block 116, SAMPLE₁ is deasserted and the ISA reset, thereby ending the capture period for the first storage element of each pixel. At functional block 118, SAMPLE₂ is asserted. At functional block 128, SAMPLE₂ is deasserted, thereby ending the capture period for the second storage element of the pixel. The ISA is also reset at functional block 120.” Col. 3, ln. 55-63. The ISA (image sensing array) is reset by Booth before each storage node is enabled, so the subsequent storage nodes are storing charges from new integration periods, and not from the same integration period as the charge stored by the first storage node.

Applicant respectfully submits that Booth does not disclose, teach, or suggest a first storage node for storing charge generated during an integration period, and a second storage node for storing charge generated during the integration period, as recited in claims 1, 11, 25, and 33. Nor does Booth disclose that the second storage node stores a portion of the charge generated during the integration period that is not stored by the first storage node, as recited in claims 1, 11, 25, and 33.

In addition, Booth discloses in FIG. 2 (reproduced below) that all of the storage capacitors 36, 46, 56 in the pixel 60 are downstream from the collection node 30, so charge is first collected in the collection node 30, and later sampled by the storage capacitors 36, 46, 56 upon assertion of an enable signal.



Applicant respectfully submits that Booth does not disclose, teach, or suggest a first storage node for storing charge generated at a photosensitive element prior to storing said charge at a floating diffusion region of said pixel cell, as recited in claims 1, 11, and 33.

Nor does Booth disclose receiving charge at a first and second storage node, and transferring charge from at least one of the storage nodes to a floating diffusion region, as recited in claim 25.

Since Booth does not disclose all of the limitations of claims 1, 11, 25, and 33, claims 1, 11, 25, and 33 are not anticipated by Booth. Claims 2, 4, 6, 9-10, 12, 14, 16, 19-20, 27-32, and 34 depend, respectively, from independent claims 1, 11, 25, and 33, and are patentable at least for the reasons mentioned above, and on their own merits. Applicant respectfully requests that the 35 U.S.C. § 102(b) rejection of claims 1-2, 4, 6, 9-12, 14, 16, 19-20, 25, and 27-34 be withdrawn and the claims allowed.

Claims 3, 5, 7-8, 13, 15, 17-18, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Booth in view of Merrill (US 6,069,376). This rejection is respectfully traversed. Claims 3, 5, 7-8, 13, 15, 17-18, and 26 depend, respectively, from claims 1, 11, and 25 and are patentable at least for the reasons mentioned above, and on their own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 3, 5, 7-8, 13, 15, 17-18, and 26 be withdrawn and the claims allowed.

Claims 21-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Booth in view of Guidash I (US 6,710,804). This rejection is respectfully traversed. Claims 21-23 depend from claim 11 and are patentable at least for the reasons mentioned above, and on their own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 21-23 be withdrawn and the claims allowed.

Claims 24 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Booth in view of Guidash II (US 6,160,281). This rejection is respectfully traversed.

Neither Booth nor Guidash II, even when considered in combination, teaches or suggests all of the limitations of independent claim 24. Claim 24 recites limitations similar to claims 1, 11, and 33; therefore, Guidash II does not cure the above-discussed deficiencies of Booth.

Since Booth and Guidash II do not teach or suggest all of the limitations of claim 24, claim 24 not obvious over the cited combination. Claim 35 depends from independent claim 33 and is patentable at least for the reasons mentioned above, and on its own merits. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 24 and 35 be withdrawn and the claims allowed.

Claims 36-37, 41, and 44-45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Booth in view of Miyamoto (US 2003/0090575). This rejection is respectfully traversed. Neither Booth nor Miyamoto, even when considered in combination, teaches or suggests all of the limitations of independent claim 35. Claim 36 recites limitations similar to claim 25; therefore, Miyamoto does not cure the above-discussed deficiencies of Booth.

Since Booth and Miyamoto do not teach or suggest all of the limitations of claim 35, claim 36 and dependent claims 37, 41, and 44-45 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 36-37, 41, and 44-45 be withdrawn and the claims allowed.

Claims 38, 40, and 42-43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Booth in view of Miyamoto, and further in view of Merrill. This rejection is respectfully traversed. Claims 38, 40, and 42-43 depend from claim 35 and are patentable at least for the reasons mentioned above, and on their own merits. Applicant

respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 38, 40, and 42-43 be withdrawn and the claims allowed.

In view of the above, Applicant believes the pending application is in condition for allowance.

Dated: November 9, 2007

Respectfully submitted,

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